

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
Joseph Byrum *et al.*

Serial No.: 10/618,101

Filed: July 11, 2003

For: HIGH YIELDING SOYBEAN PLANTS
WITH INCREASED SEED PROTEIN
PLUS OIL

Group Art Unit: 1638

Examiner: Keith Robinson

Atty. Dkt. No.: MSUT:008US

DECLARATION OF RICHARD A. LEITZ UNDER 37 C.F.R. § 1.132

I, Richard A. Leitz hereby declare as follows:

1. I am a U.S. citizen and currently reside at 432 Kelsey Ann Court, Wentzville, Missouri.
2. I have been employed by Monsanto since August 2, 1999, currently with the title of North America Soybean Variety Development Breeding Lead.
3. I hold a Ph.D. in Plant Breeding and Pathology from the University of Illinois at Urbana-Champaign and a B.S. in Plant and Soil Science from Southern Illinois University at Carbondale. I have been conducting research in the area of plant breeding since 1999. My duties have included Soybean Variety Development, Trait Integration, and Scientific Management of a soybean breeding organization.
4. I am a co-inventor of the above-captioned patent application, the ownership of which is assigned to Monsanto Technology LLC, and am familiar with the contents of the patent application.

5. I understand that the Patent and Trademark Office Examiner in charge of assessing the patentability of the referenced patent application has rejected the claims of the patent application as being obvious over Wilcox (*Crop Sci.* 38:900, 1998; “Wilcox 1998a” cited as reference C43), further in view of Conway (U.S. Patent 6,140,556; “Conway”). The Examiner has also rejected claims 1-12, 14, 15, 29, and 32 as anticipated by, or in the alternative, as being obvious over Wilcox 1998a.
6. The work described by Wilcox 1998a, or Wilcox 1998a in view of Conway, does not teach or suggest the subject matter claimed in the present application.
7. In particular, Wilcox 1998a does not teach or suggest that the phenotypes of “a mean whole seed total protein content of between 45% and 50%, a mean whole seed total oil content of at least 20%, and a commercially significant yield” may be displayed by an agronomically elite soybean plant variety, as presently claimed, or that a method of plant breeding could be successfully utilized to create soybean plants displaying such a combination of oil, protein, and yield phenotypes. This is because of the negative correlation between mean seed total oil content and mean whole seed total protein content, which was well known prior to the filing date of the present patent application.
8. This negative correlation is discussed in the Specification, for instance at page 3, lines 1-13; and page 5, lines 3-13, and in references listed therein. This is also noted in Wilcox 1998a, which states at page 900, left column, that “The lines will be useful for increasing seed protein content while minimizing reductions in seed oil content,” recognizing the difficulties in breeding for characteristics such as those presently claimed, and does not

indicate that the claimed characteristics would have been expected to be achievable prior to the teachings of the present application.

9. The negative correlation between mean seed total oil content and mean whole seed total protein content is also discussed, for instance, in cited reference C42 (Wilcox & Cavins, *Crop Sci.* 35:1036-104, 1995; "Wilcox 1995"), as noted in previous responses. At page 1040, right column, while discussing their Fig. 1, they note that "Deviations from regression of protein concentration on oil concentration were progressively smaller and R^2 values were progressively larger with successive backcrosses..." Thus, the inverse relationship between seed protein and seed oil content became stronger in successive generations of progeny. Likewise, cited reference C83 (*Crop Sci.* 38:1536-1540, 1998; "Wilcox 1998b"), for instance in its abstract, notes the negative correlation between seed protein and seed oil levels becoming stronger in later cycles of a recurrent selection breeding scheme. Thus, by the 8th cycle of such recurrent selection, as shown in Fig. 3, no plants displaying the presently claimed seed oil and protein levels, are found in the breeding population.
10. The traits of mean whole seed total oil content, mean whole seed total protein content, and yield, are known to be quantitative traits, the phenotypes of which are controlled by many genes, and the effects of which may also be influenced by the environment. This is discussed in the Specification, for instance at page 17, line 20, to page 18, line 14. However, in contrast, the present rejection apparently considers seed oil, seed protein, and yield traits to behave as if they specify qualitative characteristics and are simply inherited, which is mistaken. A skilled worker would not have understood, without the present

invention, that negatively correlated quantitative traits from variety SN30003, of seed oil and seed protein content as well as yield, could be routinely and predictably combined in progeny thereof.

11. Further, although Conway, at column 2, lines 52-56, is cited as teaching that desirable traits for instance from two or more cultivars may be combined in order to develop new cultivars by selection of desired phenotypes, Conway provides no teachings regarding a situation in which selection for expression of desirable phenotypes (and presumably inheritance of underlying desirable genotypes) is affected by negative correlations between two or more of such desirable traits, let alone when such traits are quantitative rather than qualitative in character. Thus, the cited teachings of Conway, in combination with Wilcox 1998a, do not lead a skilled worker to the present invention.
12. The methods presently claimed in this application allow for an unexpected and surprising combination of phenotypes in an agronomically elite soybean plant which is a progeny plant of soybean variety SN30003. As summarized for instance in Examples 1 and 5, the improvement relates to achieving the claimed level of mean whole seed oil content and the mean seed total protein content, while maintaining yield at a commercially significant level.
13. I hereby declare that all statements made of my own knowledge are true and all statements made on information are believed to be true and further that the statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both under § 1001 of Title 18 of the United States

Code, and that such willful false statements may jeopardize the validity of this application or any patent issued thereon.

Date: 12/21/2009

A handwritten signature in black ink, appearing to read "R. Leitz", is written over a horizontal line.

Richard A. Leitz